DESIGN AND DEVELOPMENT OF AN INTERNAL QUALITY AUDIT INFORMATION SYSTEM BASED PPEPP CYCLE

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Abstract—*The Mataram University of Technology Quality Assurance Institute already has and has established national education standards plus the standards set by universities following Permendikbud number 3 of 2020. However, there are problems with the implementation of Internal Quality Audits, where the implementation of internal quality audits is very less effective and efficient, good in terms of time, cost, and energy. This is because the Mataram University of Technology Quality Assurance Institute only has 3 auditors to audit 12 study programs in one year and even spends two months in a row. This is an important concern for researchers to build and produce an internal quality audit information system application program that can help implement the internal quality audit process carried out by the Mataram University of Technology Quality Assurance Institute. The design of the internal quality audit information system was carried out using the prototyping method. The application of the prototyping method in system design will make information system builders better and more structured. The internal quality audit information system was built using the PHP programming language with the CodeIgniter framework and MySQL as the database and implementing Code-View-Controller (MVC). The main objective of this research is to produce an internal quality audit information system so that it can assist the Mataram University of Technology Quality Assurance Institute in documenting and optimizing higher education quality management in a planned and sustainable manner following the PPEPP cycle.*

Keywords: *information systems, internal quality audit, PPEPP cycle, quality.*

Abstrak—*Lembaga Penjaminan Mutu Universitas Teknologi Mataram sudah memiliki dan menetapakan standar nasional pendidikan ditambah dengan standar yang ditetapkan oleh perguruan tinggi sesuai dengan permendikbud nomor 3 tahun 2020. Namun terdapat permasalahan pada pelaksanaan Audit Mutu Internal, dimana pelaksanaan audit mutu internal sangat kurang efektif dan efesien, baik dari segi waktu, biaya dan tenaga. Hal ini disebabkan karena Lembaga Penjaminan Mutu Universitas Teknologi Mataram hanya memiliki 3 orang Auditor untuk mengaudit 12 program studi dalam satu tahun berjalan dan bahkan sampai menghabiskan waktu dua bulan berturut-turut. Hal inilah yang menjadi perhatian penting peneliti untuk membagun dan menghasilkan program aplikasi sistem informasi audit mutu internal yang dapat membantu pelaksanaan proses audit mutu internal yang di lakukan oleh Lembaga Penjaminan Mutu Universitas Teknologi Mataram. Perancangan sistem informasi audit mutu internal dilakukan dengan menggunakan metode prototyping. Penerapan metode prototyping dalam perancangan sistem akan membuat pembangun sistem informasi menjadi lebih baik dan terstruktur. Sistem informasi audit mutu internal dibangun menggunakan bahasa pemrograman PHP dengan framework CodeIgniter dan MySQL sebagai databasenya serta menerapkan Code-View-Controller (MVC). Adapun tujuan utama dari penelitian ini adalah menghasilkan sistem informasi audit mutu internal sehingga mampu membantu Lembaga Penjaminan Mutu Univeristas Teknologi Mataram dalam mendokumentasikan dan mengoptimalisasikan manajemen mutu perguruan tinggi secara berencana dan berkelanjutan sesuai dengan siklus PPEPP.*

Kata Kunci*: sistem informasi, audit mutu internal, siklus PPEPP, mutu.*

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INTRODUCTION

Quality higher education is a big task that has been mandated by the Government through Law Number 12 of 2012 concerning Higher Education, where all universities in Indonesia must implement a Quality Assurance System to produce and create quality education. Quality higher education is higher education that produces graduates who are able to actively develop their potential and produce science and/or technology that is useful for society, nation, and state (Kebudayaan, 2020).

To produce quality education, universities must implement a Quality Assurance System in a planned and sustainable manner in accordance with the Cycle of Determining, Implementing, Evaluating, Controlling, and Improving Higher Education Standards. The evaluation as intended in the PPEPP cycle is carried out through an Internal Quality Audit (Direktorat Penjaminan Mutu, 2018).

Internal Quality Audit is a systematic, independent, and documented testing process to ensure the implementation of activities in higher education in accordance with established procedures and standards to achieve institutional goals. Thus, AMI is a very strategic stage in developing the quality of higher education, especially to improve quality on an ongoing basis (Direktorat Penjaminan Mutu, 2018).

The quality of higher education is the level of conformity between the implementation of higher education and Higher Education Standards consisting of National Higher Education Standards and Standards set by Higher Education Institutions (Kebudayaan, 2020) . To achieve this suitability, evaluation must be carried out.

Evaluation is a comparison activity between the output of activities that have been implemented by institutions and study programs with the fulfillment of national higher education standards and established higher education standards (Kementerian Riset, Teknologi, 2018). Without a good and planned evaluation, universities will not be able to carry out control and improve their quality standards.

The Mataram University of Technology Quality Assurance Institute has so far established and implemented standards, both national higher education standards and standards set by universities in accordance with Permendikbud No. 3 of 2020 (Kebudayaan, 2020). However, there are weaknesses in the Internal Quality Audit process carried out, where the Internal Quality Audit is still carried out manually and has not been systemized. Implementing an Internal Quality Audit which is carried out manually will take a very long time, even months, and require a lot of energy and costs, as well as other facilities, so, to overcome these problems, an application system is needed that able to help and provide information quickly and efficiently. appropriate, related to the data and information needed in the process of implementing the Internal Quality Audit (Muslim et al., 2021).

An information system is a technique that has the task of forming, processing, storing, analyzing, and disseminating information to achieve agreed goals (Komalasari et al., 2023).

Internal Quality Audit is a routine activity carried out by the Quality Assurance Agency repeatedly to ensure the implementation of the standards that have been set so that the quality of education can be achieved very well (Febriyanti & Irawan, 2020).

An internal quality audit information system is the application of information technology to help processes or activities carried out by a group of people become better and easier to produce the required information (Agus et al., 2023).

The Prototype method is a software development method that allows interaction between system developers and system users, so as to overcome incompatibility between developers and user (Hasanah & Untari, 2020). By applying this prototype method, system development becomes better because it suits user needs (Erkamim et al., 2022).

Meaning, that when internal auditors are efficient, they will be able to extend the scope of their tasks and carry them out effectively. Ultimately, when internal auditors become more effective and efficient, it is expected that stakeholders will be more likely to be persuaded and trust the work of the electronic internal audit (Alqudah et al., 2023).

There have been several previous studies related to the research that will be carried out, including The results of research by Suryo Widiantoro and Yodi with the title "Design and Build an Internal Quality Audit Information System Based on IAPS 4.0" in 2020. Where the research only produced a design and framework from the Internal Quality Audit information system which cannot yet be implemented (Widiantoro & Yodi, 2020), while in this research we will design and build an Internal Quality Audit information system application that can immediately be implemented to help the performance of the Mataram University of Technology Quality Assurance Institute in improving the quality of education..

Research carried out by Dwi Rani Febriyanti and Hendri Irawan with the title “Implementation of a Web-Based Internal Quality Audit Information System to Increase Work Efficiency Case Study: Budi Luhur University Quality Assurance Institute” in 2020. In this research, the quality management implemented or used still uses the old management,

namely PDCA (Febriyanti & Irawan, 2020). Meanwhile, the research that will be carried out will apply the latest quality management based on the PPEPP Cycle which is in accordance with Permenristekdikti No. 62 of 2016 Article 5 (Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi Republik Indonesia Nomor 62 Tahun 2016 tentang Sistem Penjaminan Mutu Pendidikan Tinggi, 2016).

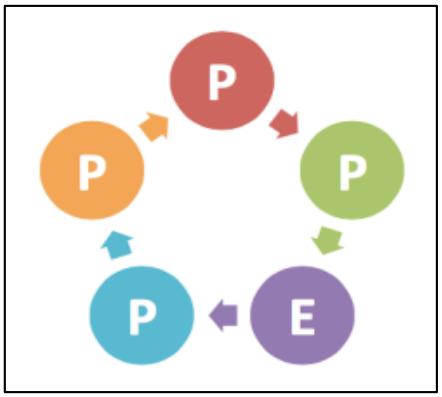
Research carried out by Andie, Muhammad Hasbi, and Hasanuddin with the title "Internal Quality Audit Information System (SIAMI)" in 2021. This application system produces an Internal Quality Audit report based on input questions entered into the application system and there is no visible control and improvement process, apart from that, this application was built using the waterfall method, PHP programming language, Dreamweaver 5.5 as a text editor (Andie et al., 2021). Meanwhile, the system to be built will be up to date in terms of output produced by a system that follows the PPEPP cycle in the audit process carried out so that the system will not only produce a quality audit report but will produce control over the results of the internal quality audit that has been carried out. Apart from that, this system will be built using the Prototyping method and the CodeIgniter framework which adopts the Model View Controller (MVC) design pattern (Norfifah et al., 2023).

Research carried out by Eva Faja Ripanti and H. A. Oramahi with the title "Design of an Information System for Management of Internal Quality Audits (AMI) in Higher Education" in 2021. The designed application cannot be fully implemented or finished, because some of the corrections or improvements that will be given, both by the auditee and the auditor, are still done manually or outside the system (Ripanti & Oramahi, 2021). Meanwhile, the research carried out will produce an internal quality audit information system that is capable of providing corrections or corrective actions through the information system that is built.

Based on the research that has been carried out, several differences or updates can be drawn from the research, including those related to cycles, software development methods, and outputs produced by information systems. The aim of this research is to produce an internal quality audit information system application that is able to assist universities in improving the quality of education based on the Determination, Implementation, Evaluation, Control, and Improvement (PPEPP) cycle which can be implemented every year continuously and sustainably in order to create a culture quality of higher education.

MATERIALS AND METHODS

The prototyping method is a software development method that can be applied to the development of small and large systems with the hope that the development process can run well. This prototyping aims to collect information and design and build a system based on the needs of users (Kustanto & Chernovita, 2021), namely the Mataram University of Technology Quality Assurance Institute following the Determination (Penetapan), Implementation (Penerapan), Evaluation (Evaluasi), Control (Pengendalian), and Improvement (Peningkatan) or abbreviated as (PPEPP) cycle as shown in Figure 1.



Source: (Directorate of Quality Assurance, 2018)
Figure 1. PPEPP Cycle

In the internal quality audit information system program, the determination menu will contain an input menu for documents and instruments created based on the quality standards held by the Mataram University of Technology Quality Assurance Institute. For the implementation menu, each unit will upload all files or evidence of standard implementation that have been implemented in the current year, while at the evaluation stage, the auditor will provide responses or comments on files or evidence of standard implementation that have been uploaded by each unit or study program. At the control stage, all study programs or units within the Mataram University of Technology will provide feedback on the responses or comments given by the auditor, while in the improvement menu, new indicators will be entered into each standard document in accordance with the results that have been achieved which will then be determined and implemented in the following year, so that the cycle can continue to be implemented in a planned and sustainable manner. The stages in creating this internal quality audit information system are as follows:

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Requirements Collection

In gathering the design requirements for an internal quality audit information system based on the PPEPP cycle, of course, researchers must involve application system users, namely the Mataram University of Technology Quality Assurance Institute team, in order to find out the problems and obstacles that have occurred so far. So by knowing these constraints, the need for data and information to design and build an internal quality audit information system can be easily determined. The data that can be collected include:

a. Study Program Data

The Mataram University of Technology has 12 study programs consisting of 7 academic education programs and 5 vocational education programs, as shown in Table 1.

Table 1. Study Program Data

No	Study Program	Education Programs
1	Informatics Engineering	Academic (Undergraduate Program)
2	Information Systems	
3	Information Technology	
4	Computer Systems Engineering	
5	Software Engineering	
6	Management	
7	Law	
8	Computer Engineering	Vocational (Diploma Program)
9	Informatics Management	
10	Computerized Accounting	
11	Administrative Management	
12	Secretary	

Source: (Universitas Teknologi Mataram, 2022)

b. Auditor Data

The Mataram University of Technology Quality Assurance Institute has 3 internal auditors who have carried out internal quality audits, including Lalu Delsi Samsumar, M.Eng, Ahmad Yani, M.Kom and Karina Nurwijayanti, M.Pd.

c. Instrument Data along with Internal Quality Audit Report

Internal Quality Audit instrument data and output are used as samples in creating an internal quality audit information system as shown in Table 2.

Table 2. Internal Quality Audit information system

No	Criteria	Question	Audit Notes	findings	Document
1	Cooperation	Has the institution implemented collaboration in the 3 fields, namely Education, Research, and Community Service?	Yes. Collaboration has been carried out in these 3 fields.	Achieved	Cooperation Agreement Letter (MoU) Proof of Collaboration
2		Has the number of local/regional level collaborations reached 4 per year?	Yes. Local level cooperation has reached 9 collaborations.	Achieved	Cooperation Agreement Letter (MoU) Proof of Collaboration Collaboration Monitoring and Evaluation Report
3		Has the number of international level collaborations reached 1 per year?	There is no international cooperation yet.	Major	
4		Has the number of collaborations in the education sector reached 2 per year?	Yes. Collaboration in the education sector has reached 4 collaborations and has exceed	Achieved	Cooperation Agreement Letter (MoU) Proof of Collaboration

No	Criteria	Question	Audit Notes	findings	Document
			ed the standards that have been set		

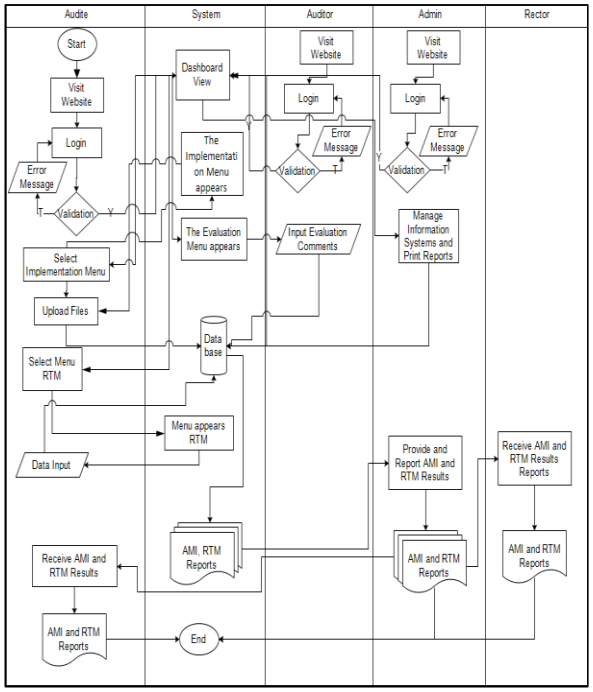
Source: (Universitas Teknologi Mataram, 2022)

Design Process

Based on data and information from the LPM TEAM, the researcher then carried out a system design process which included:

a. System Flowchart

This system flowchart describes how the flow of the internal quality audit information system works, both by the Audite (Study Program) as the auditee, the Auditor (Evaluation TEAM) as the assessor of the data that has been uploaded or attached by the auditee to the system, and the Admin as the manager full of the information system created. The system flowchart image looks like in Figure 2.

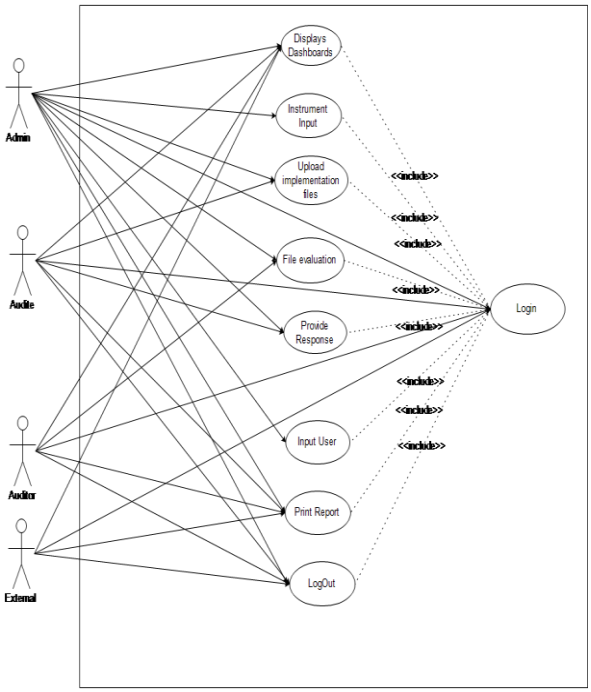


Source: (Research Result, 2023)

Figure 2. System Flowchart

b. Use Case Diagrams

The Use Case Diagram will describe the activities that can be carried out by each actor when accessing the internal quality audit information system. The use case diagram that was built is shown in Figure 3.

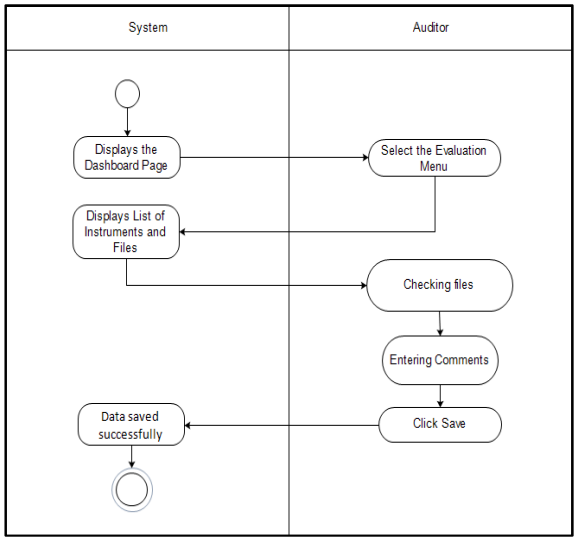


Source: (Research Result, 2023)

Figure 3. Use Case Diagram

c. Activity Diagrams

The activity diagram depicts the activities that will be carried out by the auditor, where the auditor will examine the files that have been attached or uploaded by the auditee to the internal quality audit information system, to ensure that the attached documents comply with the instrument items. The following is an example of an activity diagram carried out by an auditor after logging in to the internal quality audit information system as shown in Figure 4.



Source: (Research Result, 2023)

Figure 4. Activity Diagram

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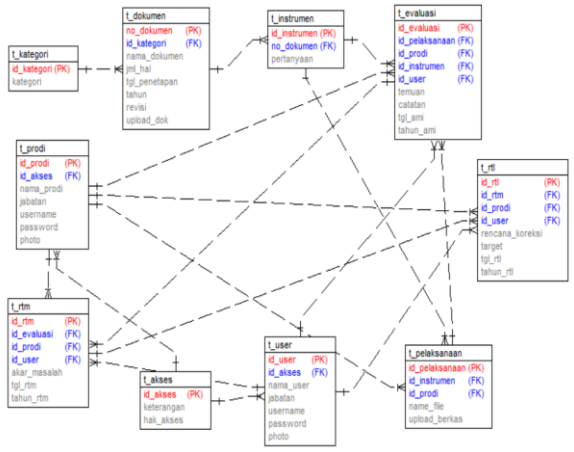
d. Entity Relationship Diagram (ERD)

This entity relationship diagram depicts the relationships formed between one table and another table in the internal quality audit information system database. The design of the ERD internal quality audit information system can be seen in Figure 5.

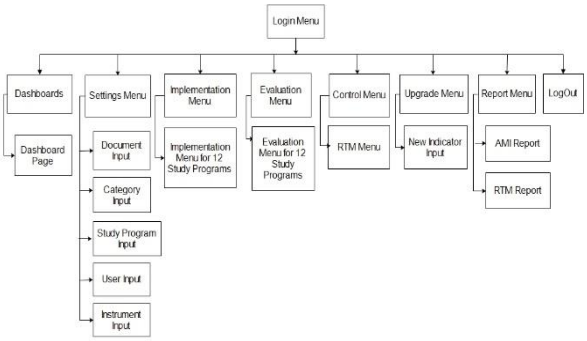


Source: (Research Result, 2023)

Figure 5. Entity Relationship Diagram (ERD)

e. Program Architecture

The program architecture will describe how the menus are arranged in the quality audit information system that will be built. The architecture of the internal quality audit information system program is shown in Figure 6.



Source: (Research Result, 2023)

Figure 6. Program Architecture

Building Prototypes

At this stage, an internal quality audit information system will be created, using the CodeIgniter framework, PHP programming language, and MySQL as a database.

Prototype Evaluation

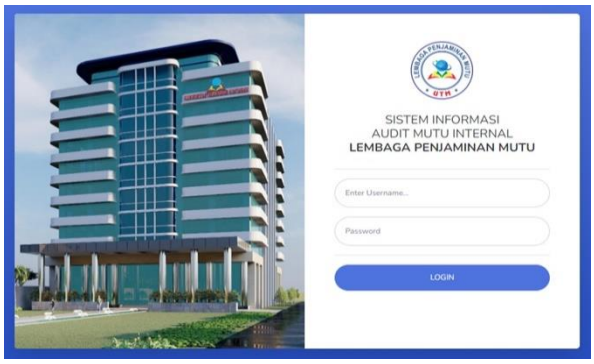
Prototype evaluation is carried out through testing carried out using black box testing with the aim of finding out whether the system being built is able to run well, both in terms of input and output produced (Yani et al., 2022).

RESULTS AND DISCUSSION

This research produces an internal quality audit information system that can help the Mataram University of Technology Quality Assurance Institute overcome the problems faced when carrying out the internal quality audit process. Apart from that, this research also has the latest results from previous research, both in terms of software development methods. , interface design, and resulting output. The results of the implementation of the internal quality audit information system can be explained as follows:

1. System Login Page

The login page is used for users to enter the internal quality audit information system, where the user must enter their user and password to be able to enter the dashboard page. The login page menu looks like Figure 7

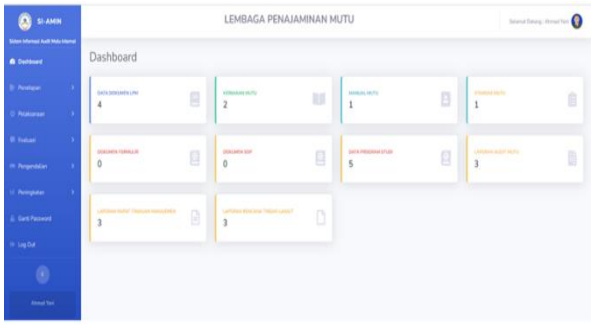


Source: (Research Result, 2023)

Figure 7. Login page

2. Dashboard page

The dashboard page is used to view all the information in the internal quality audit information system. The appearance of the dashboard page is shown in Figure 8.



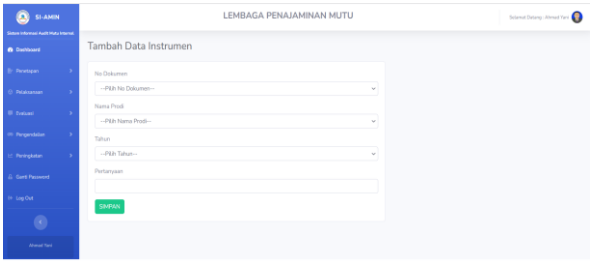
Source: (Research Result, 2023)

Figure 8. Dashboard page

3. Instrument Input Form

The instrument data input page is used to enter questions that are used when conducting internal

quality audits, where the questions are taken from the standard documents of the Mataram University of Technology Quality Assurance Institute. The display of the instrument data input form is shown in Figure 9.



Source: (Research Result, 2023)
Figure 9. Instrument Input Page

4. Study Program Implementation Page

The standard implementation page is a page used by each study program to upload standard implementation files based on questions that have been entered into the internal quality audit information system. The display of the standard implementation document upload page is shown in Figure 10.

Source: (Research Result, 2023)
Figure 10. Implementation of the Study Program

On this page each study program will go to each page according to its study program, on this page the study program will write the name of the document and upload the document according to the available questions, which will later be evaluated by the auditor team on the evaluation page.

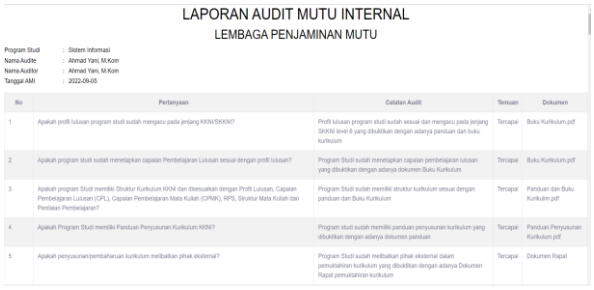
5. Evaluation Page

The evaluation page is used by auditors to provide an assessment of documents that have been uploaded by the study program in implementing the standards that have been set so that with these documents the auditor will provide an assessment of the conformity of the document with the instrument. If the documents comply or do not comply with or exceed the established standards, the auditor will assign a category to the findings and provide notes on the results found. The appearance of the evaluation page looks like Figure 11.

Source: (Research Result, 2023)
Figure 11. Evaluation page

6. Report Page

The report page is used to print the results of internal quality audit reports that have been carried out or filled in by the auditee (study program) or by the auditor. The appearance of the Internal Quality Audit Report is shown in Figure 12.



Source: (Research Result, 2023)
Figure 12. Internal Quality Audit Report

Based on the results of information system testing using the black box testing method, it can be ensured that all processes in the system can run well and smoothly without any errors. The results of the trial results on this internal quality audit information system can be seen in Table 3.

Table 3. Evaluation Results

No	Module	Scenario	Result	Description
1	Instrument Data Set Menu	Instrument Data Input	Instruments can be added	Valid
2	Study Program Implementation Menu	Input Document Name	Document Name can be input	Valid
		Upload Implementation Documents according to the instrument	Documents can be Uploaded	Valid
3		View implement	Displays implemen	Valid

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No	Module	Scenario	Result	Description
		ation documents	tation documents	
	Evaluation Menu (Auditor)	Provide information on evaluation results	Information on the evaluation results can be input	Valid
		Select a finding category	Can select the finding category	Valid
4	Control Menu	Input the Root of the problem	Successfully input the root of the problem	Valid
		Input corrective action	Successfully input corrective action	Valid
		Select a repair deadline	Successfully selected the repair deadline	Valid
5	Upgrade Menu	Input improvement indicator	Successfully input standard improvement indicators	Valid
6	Report Menu	Select Audit Report Based on Study Program	Displays the Study Program Quality Audit Report	Valid
		Select Management Review Meeting Report	Display Management Review Meeting Report	Valid

Source: (Research Result, 2023)

Based on the results of the trial implementation of the internal quality audit information system using the black box testing method, all menus and data input have been confirmed to run well follow what the user expects, and are free from errors.

CONCLUSION

With the internal quality audit information system produced in this research, the Mataram University of Technology Quality Assurance Institute can overcome and resolve every problem and obstacle that has been encountered when carrying out internal quality audits, because all the activities carried out are structured and programmed appropriately well in a system. Apart from that, this internal quality audit information system can provide convenience for quality assurance institutions in making reports and documentation as well as improving quality periodically and continuously.

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